

REMARKS

Claims 1-4, 15-18, 21, 22, 24-31 are pending in this application.

Claim 32 is added herein.

Claim(s) 1-3, 17, and 32 are independent.

Claims 1, 17-18, 21-22, 24 and 28 stand rejected under 35 USC §103 as unpatentable over JP 11-293365 (PTO-1449, abstract, lines 5-7, and Figure 1), JP 51-045528 (abstract, lines 1, and 5), JP 11-293431 (abstract, lines 1, 3, and 4-6) or JP 2000-169918 (abstract, lines 3-4, and paragraph 0017) in view of JP 61-113740 (abstract, lines 1-3 and 14-15). Claims 1, 3, 17-18, 22, 24 and 28 stand rejected under 35 USC §103 as unpatentable over JP 05-051675 (abstract, lines 1-2) in view of JP 61-113740 (abstract, lines 1-3 and 14-15). Claims 1-3, 17-18, 21-22, 24 and 28-31 stand rejected under 35 USC §103 as unpatentable over JP 57-070244 (abstract, lines 1-4 and 9-10) or DD 290501 (abstract, lines 1-5) in view of JP 61-113740 (abstract, lines 1-3 and 14-15). Claims 4 and 15-16 stand rejected under 35 USC §103 as unpatentable over references in view of JP 02-204919 (abstract, lines 1-5). The rejections are respectfully traversed.

Prior traversal arguments regarding the applied art and art combinations are incorporated herein in their entirety.

The Examiner continues to rely on the abstracts of the '365, '528, '431, '918, '675, '244, and '501 references in rejecting the claims. In the most recent Official Action the Examiner acknowledges that these references, as well as the '740 and '919 references, do not disclose the expressly claimed purity levels of AG, Mg, and In. Again

the Examiner puts forward the argument: "the claimed purity of each elemental element does not exist in the final wire product" (paper no. 16, page 3, lines 12-13). It is respectfully submitted that the major portion of the final wire product contains a high-purity copper matrix, having added thereto an element or elements, such as Ag alone, Ag and Mg, Ag and In, or at least one of Ag and a Mg In combination. Such a high-purity matrix functions to increase the amount of drawn wire, as discussed in prior responses. Table 1 of the present specification clearly shows that the amount of drawn wire (the final wire product) significantly increases as the impurity content of the matrix decreases. Accordingly, the Examiner's position regarding the claimed purity not existing in the final product is not understood.

The Examiner now combines the previously applied '365, '528, '431, '918, '675, '244, and '501 references with the previously applied '675 reference. Notwithstanding the fact that the Examiner acknowledges the applied references fail to teach or suggest expressly recited claim limitations, there is no motivation to combine the '675 reference with any of the other references, and even if there were so, such combinations would not read upon the present claims, as discussed below.

The following table depicts wire attributes disclosed in each of the '365, '528, '431, '918, '675, '244, '501, and '740 references.

| | '365 | '528 | '431 | '918 | '675 | '244 | '501 | '740 |
|--------------------|-----------|------------|-------------|-----------|---------|--------|---------|---------|
| Wire diameter (mm) | 0.015-0.1 | 0.08, 0.05 | ≤ 0.05 | 0.02-0.05 | 1.0 | 1 | (-) | 0.025 |
| Cu purity (%) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | 99.999 |
| Ag | 1-4.5 | 0.5-4.0 | 1.0-4.5 | 0.05- | 0.0-1.0 | 0.005- | Up to 5 | 0.0005- |

| | | | | | | | | |
|------------------|--|--|--|-----|--|-----|--|------|
| content (wt%) | | | | 2.0 | | 1.0 | | 0.01 |
|------------------|--|--|--|-----|--|-----|--|------|

(-): not described

As seen in the table, the '740 reference excludes an amount of Ag greater than 100 wt ppm (= $100 \times 10^{-4} = 0.01$ wt%) being added to Cu.

More particularly, the '740 reference teaches adding to copper at least one of Ti, Cr, Mn, Fe, Ni and Co, and at least one of Zr, Nb, Pd, Ag, In and Sn. At page 2, right-bottom section, lines 2-6, the '740 reference recites "[h]owever, when the aforementioned elements are added exceeding each upper limit, the bonding characteristic lowers because of excessive hardness and, simultaneously, the reliability degrades since its electrical conductivity cannot be maintained. Those drawbacks occur when the amount of the added elements exceeds 150 wt%." Further, at page 4, left column under Table (2), lines 1-6, the '740 reference reads "[i]n view of the measurement results as shown in Table (2), it is determined that the added amount of Ti, Cr, Mn, Fe, Zr and Nb is 6 to 50 wt ppm and that the added amount of No, Co, Pd, Ag, In and Sn is 10 to 100 wt ppm. When two or more of the elements are added, the upper limit is to be 150 wt ppm." Thus, '740 teaches against the addition of Ag exceeding 100 wt ppm (= 0.01 wt%) to high-purity copper (99.999%).

Each of the '365, '528, '431, '918, and '675 references discloses copper alloy wires having an Ag content at least greater than 0.05 wt%, as shown in the above table. Accordingly, for at least this reason, one of ordinary skill in the art would not be motivated to combine any of these five references with the '740 reference because the '740 reference explicitly teaches against such a combination, i.e., such a combination

would produce an excessive amount of Ag, according the '740, resulting in excessive hardness and degradation in electrical conductivity.

The '244 reference discloses an Ag content of 0.005 to 1.0 wt%, and the '501 reference discloses an Ag content of up to 5 wt%. Even if one were somehow motivated to combine either the '244 or the '501 reference with the '740 reference, which it is respectfully submitted is not the case, such a combination would not read upon the present claims. In particular, because '740 explicitly excludes the addition of more than 0.01 wt% Ag, any Ag content of '244 or '501, when combined with '740, must be limited to less than 0.01 wt%. Such a wt% of Ag (0.01 wt%) is less than the wt% required by the present claims (1.0 to 5.0 wt%).

Furthermore, even if one were somehow able to combine the '740 reference with any of the '365, '528, '431, '918, '675, '244 or '501 references, such a combination would not make the present claims obvious. This is because the copper purity recited in the present claims, 99.9999 (6N)% or more, is not taught by any of the references, including the '740 reference. '740 only discloses a copper purity of 99.999 (5N)%. The remaining references fail to even address copper purity.

Additionally, none of the '365, '528, '431, '918, '675, '244, '501, or '740 references disclose, or even suggest, that the purity of copper contributes to an increase in the amount of drawn wire, as discussed above and in previous responses. The Examiner argues in the most recent Official Action that the '740 reference "in abstract teaches 5N purity copper is conventionally use for wires in the same field of endeavor or the analogous metallurgical art for improving conductivity" (paper no. 16,

page 3, lines 7-9). It is respectfully submitted that the Examiner's reading of the '740 reference is mistaken. The abstract of the '740 reference describes "[t]he bonding Cu wire is used as a substitute of Au wire, and ...maintains electrical conductivity. In an example, the Cu wire comprising by wt. 2 ppm Ti, 2 ppm Zr, and bal. 99.999% Cu, 25 micron dia. which was made by repeated drawing and process heat treatment."

That is, the '740 reference teaches using the bonding Cu wire as a substitute for Au wire, and that when Cu wire is substituted the electrical conductivity is maintained as compared to the use of Au wire. Thus, it is not true, as the Examiner contends, that the '740 reference teaches that 5N purity copper is used for improving conductivity.

Also, one of ordinary skill in the art would not have been motivated to replace the 99.999 (5N)% purity copper disclosed in '741 with 99.9999 (6N)% or more purity copper, as required by the present claims. This is so because it is well understood by one of ordinary skill in the art that the higher a purity of raw material is, the higher the manufacturing cost of the final product will be. Therefore, increasing the purity of copper is contrary to both the common sense and the business sense of one of ordinary skill in the art.

In fact, through the present inventors' testing and evaluation of the differences in purity of copper, they are the first to have found the novel effect of an increase in the amount of drawn wire utilizing copper of the purity of 99.9999 (6N)%.

Thus, in view of the foregoing, it is respectfully submitted that the Examiner's obviousness rejection appears to be based on improper hindsight based upon the work of the present inventors. Accordingly, it is respectfully requested that the Examiner

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reconsider and withdraw the rejection of independent claims 1, 2, 3, and 17, as well as, for at least these reasons, dependent claims 4, 15, 16, 18, 21, 22, and 24-31.

Independent claim 32 is added herein to recite the invention somewhat differently. It should be clear from the above that claim 32 is both novel and unobvious.

In view of the above, it is respectfully submitted that the application is in condition for allowance and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed local telephone number, in order to expedite resolution of any remaining issues and further to expedite passage of the application to issue, if any further comments, questions or suggestions arise in connection with the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 01-2135 and please credit any excess fees to such deposit account.

Respectfully submitted,
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